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Krummrich Industrial Waste (Monsanto) Landfill Site, Sauget, Illinois

Milt Clark
Environmental and Human Health Specialist

Sandra S. Gardebring
Acting Enforcement Counsel

THRU: Karl E. Bremer, Chief
Toxic Substances Section
Toxic Materials Branch

Introduction/Abstract

A comparative analysis is provided on chemicals (1) detected in seepages from the Krummrich Industrial Waste (Monsanto) Landfill site on the Mississippi River, (2) detected in monitoring wells at the same site, (3) reported by Monsanto to be disposed of in the same site, and (4) reported to be manufactured by the Krummrich Plant in the 1977 chemical inventory of the Toxic Substances Control Act (TSCA) and under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA). The analysis reveals that there is substantial association between chemicals detected in seeps from the site by Illinois Environmental Protection Agency (IEPA) and Monsanto and those chemicals reported to have been disposed of at the Krummrich Landfill, manufactured by Monsanto, and found in monitoring wells. Taken in total, the strength of these associations leaves little doubt that the source of the seeps and the contamination of the Mississippi River bank is the Krummrich Industrial Waste Landfill site.

Analysis

As shown in the table "Chemical Data: Krummrich Plant and Disposal Site, Sauget, Illinois" (Attachment 1), of 26 specific compounds or classes of compounds detected by IEPA in seeps (Attachments 2, 3 and 4) emanating from the Krummrich Landfill, Monsanto reported disposing of 14 (54%) of these compounds or classes in the Krummrich Landfill in 1968 (Attachment 5). The association between chemicals found in seeps and those disposed of by Monsanto would be expected to be even more substantial if detailed knowledge were available on (1) specific compounds disposed (i.e., aromatic carboxylic acids), (2) wastes from production processes (i.e., sludge from alkyl benzene filtration), (3) wastes from research (i.e., miscellaneous solvents and materials), and (4) wastes placed in the Krummrich Landfill from the Monsanto plant located in St. Louis, Missouri. Eight compounds were detected in concentrations exceeding 10 ppm in one more of the seeps at the Krummrich Landfill. Five of these eight compounds were reported by Monsanto to have been the dominate chemicals landfilled at the Krummrich site (700 - 3,000 yard^3). It would be expected that these particular chemicals would be present at much higher concentrations in the seeps, relative to the other chemicals detected. Two other compounds--2,4-D and

G195
C. R. Pfafland
Rep

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Chickens quantities ... D.W. GK
...9283

Attachment 6

Time Collected: ______ Lab # ______

SPECIAL ANALYSIS FORM

Date Collected: 10/23/79 Date Received ______

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
DIVISION OF LAND/NOISE POLLUTION CONTROL

COUNTY:	FILE HEADING:	FILE NUMBER:
St. Clair	Sauget/Toxic Dump	16312103

SOURCE OF SAMPLE: (Exact Location)

G195 well located on east boundary at the center of the site. well is 35' deep

PHYSICAL OBSERVATIONS, REMARKS: dark gray color strong organic chemical odor.

TESTS REQUESTED: CHECK FOR PRESENCE OF CHEMICALS LISTED IN THE 8-16-69 AND 11-27-77 LETTERS FROM MONSANTO

COLLECTED BY: P.C. Mann + K. Mensing DLPC TRANSPORTED BY: KEN MENSING DLPC

LABORATORY

RECEIVED BY: GP DATE COMPLETED: DATE FORWARDED: 8/11/80

J Hume

chlorophenol, dichlorobenzene, diphenylether, chlorotoluene, alkylphenol and aliphatic hydrocarbons are present in this sample.

Chlorophenol = 810 ug/l (PPb)
Dichlorobenzene = 1600 ug/l
Chlorotoluene = 18,000 ug/l
Diphenylether = 2100. ug/l

RECEIVED
AUG 12 1980
E.P.A. — D.L.P.C.
STATE OF ILLINOIS

K

(NOT FOR DATA PROCESSING)

7. Miscellaneous Wastes -

These consist of spoiled material, floor sweepings, sludge from cleaning equipment and storage tanks etc which would cause problems if sewered. They are mostly reaction products of the above materials eg Esters of phenols or aliphatic alcohols with carboxylic acids such as phthallic, Maleic, or Benzoic acid, Anilides, Sulphonated phenols or other aromatics.

The relative quantities of these materials will necessarily vary according to sales of particular products and there will be additions to and deletions from this list. However, the general chemical classification will remain much the same.

Please let me know if you need any additional information.

Very truly yours,

J. R. McClain
Plant Manager

jo

2.	By-Products -	
	a. Mixed isomers of nitrochlorobenzene	1,700 Cu. yds
	" " " Dichlorophenol	3,000 Cu. yds
	b. Waste Maleic Anhydride	730 Cu. yds
	c. Waste Chlorobenzenes and Nitro-chlorobenzenes	120 Cu. yds
3.	Contaminated Water and Acids -	
	a. Water with varying amounts of phenols (0-15%)	7,200 Cu. yds
	b. Waste Sulfuric acid with chlorophenol present	1,500 Cu. yds
	c. Caustic Soda Solution with chlorophenol present	5,300 Cu. yds
4.	Waste Solvents -	
	a. Waste Methanol contaminated with Mercaptans	600 Cu. yds
	b. Waste Isopropanol - Water and chlorinated hydrocarbon	5,500 Cu. yds
	c. Research Waste: Miscellaneous Solvents and Materials	1,019 Cu. yds
	d. Oily Materials from Oil Additive Production	101 Cu. yds
5.	Filter Sludge -	
	a. Attapulgus Earth -Keisulguhr from Alkyl Benzene filtration	600 Cu. yds
	b. Lime Mud from nitro-aniline production.	1,000 Cu. yds
6.	Unwanted Samples and Waste resulting from taking samples -	
	a. Chlorophenols	72 Cu. yds
	b. Laboratory Samples (Everything)	208 Cu. yds

Attachment 5

Monsanto
COMPANY

Sauget, Illinois 62201
(618) 271-5035

August 16, 1968

Mr. C. W. Klassen
Technical Secretary
State of Illinois Sanitary Water Board
Springfield, Illinois 62706

Dear Mr. Klassen:

In reply to your letter of August 7, 1968, I have the following information which you need to set up a monitoring program for our industrial waste disposal site.

In general we deposit at this site those wastes which would add to the sludge load at the waste treatment plant or would dissolve in our wastewater and add to the phenol content, C.O.D. or color of the final effluent. Chemically, they fall into 6 main groups:

1. Phenols
2. Aromatic Nitro Compounds
3. Aromatic Amines and Nitro Amines (highly colored)
4. Chlorinated aromatic hydrocarbons
5. Aromatic and aliphatic Carboxylic acids
6. Condensation or reaction products of the above

A more detailed list of sources and quantities follows:

1. Still Residues - tars, condensation and decomposition products of doubtful composition but with some of the primary product remaining.

From the Distillation of:	Approx. Annual Amount
a. Phenol	1,020 Cu. yds.
b. Chlorophenol	720 Cu. yds.
c. Nitro-Aniline and similar compounds	1,700 Cu. yds.
d. Chlorobenzol (Tri-Tetrachlor)	130 Cu. yds.
e. Chloro aniline	1,100 Cu. yds.
f. Other aniline derivatives	200 Cu. yds.
g. Nitro benzene derivatives	100 Cu. yds.
h. Aromatic carboxylic acids (Maleic, Phthalic, etc.)	1,500 Cu. yds.
i. Chlorophenol Ether	350 Cu. yds.

Attachment 4

Time Collected: [illegible]

Lab # D022687 621

Date Collected: 10/2/81

SPECIAL ANALYSIS FORM

Date Received OCT 5 1981

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
DIVISION OF LAND/NOISE POLLUTION CONTROL

COUNTY:	FILE HEADING:	FILE NUMBER:
St. Clair	Sauget/Dump (Toxic)	General

SOURCE OF SAMPLE: (Exact Location) A- (water sample collected from leachate seep along Each Mississippi River bank x 30 ft. from river edge.

PHYSICAL OBSERVATIONS, REMARKS: sample relatively colorless although some sediment is mixed with the sample; strong organic odor

TESTS REQUESTED: Quantitative analyses for chlorophenols, chlorobenzene, chlorotoluene; 2,4,5-T; identify any other constituents; WARNING sample may contain DIOXINS (RUSH)

COLLECTED BY: [illegible] NLR TRANSPORTED BY:

LABORATORY

RECEIVED BY: BH DATE COMPLETED: 11/23/81 DATE FORWARDED: 11/23/81

PCBs < 0.5 ug/l (ppb)

Toluene = 11. ug/l

Chlorobenzene = 160, ug/l

Chloroaniline = 24,000 ug/l

Chloronitrobenzene = 21000, ug/l

2,4 D = 16,000 ug/l

2,4-D isomer or very similar compound = 38,000 ug/l

2,4,5T - < 200 ug/l

2,4,5-T or very similar compound = 10,000. ug/l

Dichloronitrobenzene = 740. ug/l

Dichloroaniline = 870, ug/l

Chloronitroaniline = 64 ug/l

Nitroaniline = 100. ug/l

Chlorophenol = 15,000. ug/l

phenol = 22000. ug/l

Methylphenol = 570. ug/l

Dichlorophenol = 32,000 ug/l

Nitrophenol = 600 ug/l

Biphenyldiol = 1700. ug/l

Aniline = 550. ug/l

Methylbenzene sulfonamide = 13 ug/l

4-Methyl-2-pentanol = 26. ug/l

2-Methylcyclopentanol = 93 ug/l

Biphenyl-2-ol = 300 ug/l

Benzene sulfonamide = 76 ug/l

The following acids or their derivatives were also detected.

Benzoic acid/derivative = 12,000 ug/l

Hydroxybenzoic acid/derivative = 12,000 ug/l

and Benzene-chlorocarboxylic acid/derivative = 2500 ug/l

IL 532-0314
LPC 8A 4/77

(NOT FOR DATA PROCESSING)

D022687

Time Collected: _____ Lab # D022688

Date Collected: 10/2/81 SPECIAL ANALYSIS FORM Date Received OCT 5 1981

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
DIVISION OF LAND/NOISE POLLUTION CONTROL

COUNTY:	FILE HEADING:	FILE NUMBER:
St. Clair	Sourcil/Dump (Toxic	General

SOURCE OF SAMPLE: (Exact Location) B - water sample collected from leachate seep downgradient from where A was collected; also along the River Bank ≈ 50 ft from river's edge

PHYSICAL OBSERVATIONS, REMARKS: sample liquid was relatively colorless strong organic odor

TESTS REQUESTED: quant, tative qualysee for chlorophenols, chlorobenzenes chlorotoluene; 2,4,5-T; identify any other constituents; WHOLE sample may contain DIOXINS (RUSH)

COLLECTED BY: D.C. Mann DLC TRANSPORTED BY:

LABORATORY

RECEIVED BY: BH DATE COMPLETED: 11/23/81 DATE FORWARDED: 11/23/81

PCBs < 0.5 ug/l (ppb)
Toluene = 40 ug/l
Chlorobenzene = 390 µg/l
Chlorophenol = 30,000 µg/l
Chloroaniline = 22,000 µg/l
Dichlorophenol = 7200 µg/l
Chloronitrobenzene = 9600 µg/l
Dichloroaniline = 820 µg/l
Biphenyl-2-ol = 300 µg/l
2,4D = 17,000 µg/l
2,4-D isomer or very similar compound = 42,000 µg/l
2,4,5-T < 200. µg/l
2,4,5-T isomer or very similar compound = 12,000 µg/l

Phenol = 17,000. ug/l
Methylphenol = 220. ug/l
Methylbenzenesulfonamic = 2000. µg/l
Aniline = 120. µg/l
Dichloronitrobenzene = 590. µg/l
Benzenesulfonamide = 63 µg/l
Chloronitroaniline = 33. µg/l
Nitroaniline = 23. µg/l
Dichlorobenzene = 110 µg/l
Benzoic acid derivative = 6600. µg/l

IL 532-0314
LPC 11A 4/77
(NOT FOR DATA PROCESSING)
D022688

Attachment 2

Time Collected: ______ Lab # 0022689

SPECIAL ANALYSIS FORM

Date Collected: 10/2/81 Date Received OCT 5 1981

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
DIVISION OF LAND/NOISE POLLUTION CONTROL

COUNTY:	FILE HEADING:	FILE NUMBER:
St. Clair	Sauget/Dump (Toxic)	General

SOURCE OF SAMPLE: (Exact Location) C - water sample collected from leachate seep downgradient from where B was collected; also along river bank ≈ 20 ft from river's edge.

PHYSICAL OBSERVATIONS, REMARKS: Sampled liquid was relatively colorless, strong organic odor.

TESTS REQUESTED: quantitative analyses for chlorophenols, chlorobenzene, chlorotoluene, 2,4,5-T; identify any other constituents; WARNING Sample may contain DIOXIN RUSH

COLLECTED BY: [illegible] IEPC TRANSPORTED BY:

LABORATORY

RECEIVED BY: BA DATE COMPLETED: 11/23/81 DATE FORWARDED: 11/23/81

[signature] Hurley

PCBs = 2.6 ug/l (ppb)

Toluene = 150. ug/l

Chlorobenzene = 1600 ug/l

4-Methyl-2-pentanone = 180 ug/l

Dichlorobenzene = 250 ug/l

Chloroaniline = 38,000 ug/l

Dichlorophenol = 2100. ug/l

Chloronitrobenzene = 820 ug/l

Dichloronitrobenzene = 790 ug/l

Dichloroaniline = 2800 ug/l

Biphenyl-2-ol = 280 ug/l

2,4D = 7,800 ug/l

2,4-D isomer or very similar compound = 29,000 ug/l

Chlorophenol = 27,000.

Phenol = 12,000. ug/l

Methyl phenol = 110. ug/l

Methylbenzenesulfonamide = [illegible]

Chloromethylphenol = [illegible]

Aniline = 35. ug/l

2,4,5-T isomer or very similar compound = 6500 ug/l

2,4,5-T < 200. ug/l

Benzoic acid/derivative = 2[illegible]

Benzenedicarboxylic acid/derivative = 360 [illegible]

IL [illegible]
LPC [illegible] 4/77

(NOT FOR DATA PROCESSING) 0022689

CHEMICAL DATA: KRUMMRICH PLANT AND DISPOSAL SITE, SAUGET, ILLINOIS

SEEP ANALYSIS			MONITORING WELLS	DISPOSAL	MANUFACTUR
IEPA	Monsanto	EPA	IEPA	MONSANTO	MONSANTO
PCB	X				X
Toluene					
Chlorobenzene	X			X (1,100 yd^3)	X
Dichlorobenzene	X		X		X
Chloroanaline*	X			X (1,100 yd^3)	X
Chloronitrobenzene*	X			X (1,700 yd^3)	X
Dichloronitrobenzene					X
Chlorophenol*	X		X	X (>720 yd^3)	X
Dichlorophenol*	X			X (3,000 yd^3)	X
2,4-D/2,4-D-Disomers*	X				X
2,5,-T/Similar Chemical*					X
Analine	X				
Dichloroanaline	X			X (analine derivatives)	
Chloronitroanaline				X (analine derivatives)	X
Nitroanaline				X (1,700 yd^3)	X
Phenol*	X			X (1,000 yd^3)	
Nitrophenol					
Methylphenol					
Diphenyldiol	X		X		
Diphenyl-2-ol					
Benzoic compounds*				X	X
4-methyl-2-pentenol				X (aliphatic alcohols)	
2-methylcyclopentanol				X (aliphatic alcohols)	
Benzene sufonamide				X (sulfonated aromatics)	
Chlorotoluene			X		X
Dioxins/dibenzofurans	X	X		X (byproduct)	X(byproduct)

*Concentrations >10 ppm in seeps (IEPA data)

2,4,5-T--and their derivatives found above 10 ppm are known to have been produced at the Krummrich plant in Sauget. These chemical wastes may have been landfilled at the Krummrich site after 1968 or were unreported at that time. Chlorinated dioxins and dibenzofurans, which were also detected in seeps from the Krummrich Landfill by Monsanto and EPA, are widely recognized as contaminants of chlorophenolic chemical wastes such as those manufactured and landfilled by Monsanto in Sauget.

With the exception of nitroaniline, chemicals (86%) disposed of at the Krummrich site in excess of 700 cubic yards were present in one or more of the samples analyzed by Monsanto and IEPA. This high degree of association provides particularly strong and convincing evidence that the source of the seeps is the Krummrich Landfill. Further support for this conclusion is provided from Monsanto's chemical production records, from TSCA and from FIFRA. Fifteen (58%) of the 26 chemicals detected in the seeps by IEPA and EPA are produced or are known by-products (i.e., chlorinated dioxins and dibenzofurans) of the Krummrich plant. Using Monsanto's data on seeps, nine (75%) of the 12 chemicals found in seeps have been produced at the Krummrich plant. In addition, all four chemicals discovered by IEPA in monitoring wells at the Krummrich Landfill were also present in seeps emanating from the site (Attachment 6).

Conclusion

Taken together, these associations provide strong evidence that the Krummrich Landfill is the source of the seeps found on the Mississippi River bank immediately below the landfill site.

Attachments

cc: Bartelt
Fenner
O'Toole
Moloska
Daggett